

Experiment and Metrics Design

The city of Metropolis is more active during the day, while the neighboring city of Gotham is more active at night. The cities are separated by a single toll bridge and to encourage drivers to be available in both cities, Ultimate has decided to start a program to reimburse the toll cost for drivers who travel between cities.

Use of this toll would indicate traveling between the cities and would also indicate drivers being available in both cities. An increase of the number of uses of the toll bridge would indicate that the initiative is a success. If Ultimate already has data about the usage of the toll then that data can be used otherwise we need to create that data. We can either split our drivers into two A/B camps, one with reimbursed toll cost and one not, and compare them, or we can delay the start of the program and collect data from before and after the toll reimbursement program starts. Since it would be difficult to keep secret the existence of the program if the drivers were split in two, I would recommend delaying the start of the reimbursement data and collecting data as to the number of times each driver crosses the bridge each day.

After this control data collection period, our toll reimbursement data collection period would begin, and I would continue to collect data on the number of times each driver crosses each day. I would average the daily sums of crosses before and after the beginning of the program. Then I would perform a one-sided t-test on the post-program mean, comparing it to the pre-program mean, to see if crossings have increased in a statistically significant way. If they have the program is a success.

Some caveats on this approach include the normal caveats about statistical significance on t-tests and the possibility of false positives or negatives. Another would be based on the different rhythms of each city. Ideally, more drivers would be available during the day in Metropolis, then as night falls they would cross into Gotham. Alternatively they would start at night in Gotham then cross into Metropolis as the sun rises. If the bridge crossings do not occur at that time it would mean a driver is potentially crossing into a less busy area, which is not a preferred outcome. Ideally we would see many crossings into Gotham at sunset, and into Metropolis at sunrise to maximize each drivers profitability.